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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/721,075

11/26/2003

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0756-7223

7829

31780

7590

07/23/2008

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ART UNIT

PAPER NUMBER

3742

MAIL DATE

DELIVERY MODE

07/23/2008

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

DETAILED ACTION

Double Patenting

The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the “right to exclude” granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

Claims 1-2, 4-11, 13-20, 22-29, 31-38, 40-47 & 49-54 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-25 of copending Application No. 10/792,797. Although the conflicting claims are not identical, they are not patentably distinct from each other because drawn to a laser irradiation apparatus and associate processing.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1-2, 4-11 & 13-18 are rejected under 35 U.S.C. 102(a & e) as being anticipated by Yamazaki et al. (USPN 6,700,096 or USPAP 2003/0136772).

Yamazaki et al. ('096) discloses a laser apparatus for manufacturing a semiconductor device using laser irradiation. Two types of lasers may be used, these being, pulse oscillation and continuous oscillation. The semiconductor device has a semiconductor film formed on an insulating surface. The laser apparatus includes a plurality of laser oscillation apparatuses (102a-102d). The apparatuses may be based on one laser or on a plurality of lasers. Wavelengths may be the same or different. Many types of lasers (pulsed and continuous) may be used, these include: an excimer laser (λ 308 nm), a solid laser, an Ar laser, a Kr laser, YAG laser, a YVO₄ laser, a YLF laser, a YAlO₃ laser, a glass laser, a ruby laser, an alexandrite laser, a Ti:sapphire laser, and a Y₂O₃ laser. These lasers may be doped with Cr, Nd, Er, Ho, Ce, Co, Ti, Yb or Tm.

The fundamental wave of the laser differs depending on a material to be doped. An example is a laser light having a fundamental wave in the range of $1\mu\text{m}$. It is possible to obtain a harmonic wave with respect to the fundamental wave using a nonlinear optical element. For crystallization of an amorphous semiconductor film it is preferable that the second harmonic through the fourth harmonic of a basic wave is applied. Typically, the second harmonic (with a λ of 532 nm) or the third harmonic (with a λ of 355 nm) of an Nd:YVO₄ laser (basic wave of 1064 nm) is applied. A gas laser or a solid-state laser of continuous or pulsed type oscillation may be used.

The laser beam spots may be shaped with an optical system into rectangular shapes, circular shapes, cylindrical shapes, ellipse shapes, slab shapes and so forth. The laser apparatus includes an optical system that is capable of having beam spots oscillated from respective laser oscillation apparatuses to overlap each other on the object to be processed (see all figures, specifically figures 3A-B). In addition, the laser apparatus CPU system controls the oscillation of the laser and the stage such that beam spots are corrected placed. Figures 3A-C shows a position control system. As shown in figure 3A the beam spots of respective laser beams are combined by matching the major axes of respective ellipses and also having the beam spots **overlap** each other, thereby forming one beam spot. The combined beam spots are irradiated onto a substrate that is being processed. The center axis of the beam spot may be perpendicular to the scanning direction or at an angle of $45^\circ \pm 35^\circ$. Figures 5A-B and figures 11A-B show the differing angles that may be used during processing.

The focal distance and incident angle of each lens may be set to obtain desired processing results. The number of cylindrical lenses is not limited and the optical system used is not limited to cylindrical lenses. The optical system is capable of processing the laser beam spot of a laser light oscillated from each laser oscillation apparatus so that there is obtained a shape and energy density suited for the crystallization of a semiconductor film. In addition the optical system combines the beam spots of all laser beams into one beam spot by having the beam spots overlap each other. It is preferable that the laser beam incident angle θ satisfies the condition of $\theta \text{ arc tan } (W/2d)$ whereby W is related to the beam spot dimension (short side or long side) and d is thickness of the transmitting substrate. It is required that each laser beam satisfies this equation/condition before synthesizing.

In one embodiment the silicon nitride film formed using nitride gas is characterized in that there is an absorption peak of N-H association and Si-H association. Thus the apparatus has wavelengths that range in the absorption range.

It is further noted that the absorption coefficient is a property of the substrate and not a structural limitation of the apparatus. A recitation of the intended use of the claimed invention must result in a structural difference between the claimed invention (the apparatus, not the workpiece) and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 19-20, 22-29, 31-38 40-47 & 49-54 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yamazaki et al. ('096) as stated above and further in view of Yamazaki et al. (USPN 6,242,292) and Yamazaki (USPN 7,132,375).

Although Yamazaki et al. ('096) discloses absorption with respect to nitriding, absorption specifically with respect to a semiconductor material ($1 \times 10^4/\text{cm}$ or greater) is not taught.

Yamazaki et al. ('292) discloses that amorphous semiconductor material has a very different absorptance laser energy property than crystalline semiconductor material. In order to obtain a more uniform converted film, a two stage irradiation process is used, as follows: the amorphous portion remaining in the film is crystallized by a first irradiation process, and then the whole crystallization is promoted by a second irradiation process. By promoting the crystallization moderately, the nonuniformity of stripes occurring on the semiconductor material due to the linear laser irradiation can be suppressed to some degree. Thus, the uniformity of the irradiation effect of the laser

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light can be remarkably improved and the stripes are made visually relatively inconspicuous.

It would have been obvious to one of ordinary skill in the art at the time of the invention to use a laser wavelength based on absorptance because this distinguishes between amorphous and crystalline and yields a more completely converted substrate.

Yamazaki et al. ('292) disclosed absorptance but not the specific values.

Yamazaki ('375) disclose that in the annealing and processing of silicon the absorption coefficient of the amorphous silicon is approximately 10^3 to $10^5/\text{cm}$.

It would have been obvious to one of ordinary skill in the art at the time of the invention to use the absorption coefficient of approximately 10^3 to $10^5/\text{cm}$, as taught by Yamazaki ('375) in the Yamazaki et al. ('096) because most semiconductor devices use silicon as an initial substrate.

It is well settled that where patentability is predicted upon a change in a condition of prior art process, such as absorption coefficient ($1 \times 10^4/\text{cm}$ or greater), the change must be at least "critical", that is, it must lead to a new and unexpected result. Yamazaki ('375) absorption coefficient of approximately 10^3 to $10^5/\text{cm}$ encompasses the claim limitation of $1 \times 10^4/\text{cm}$ or greater. Thus applicant has the burden of providing proof of criticality. Note *In re Aller* et al. 105 USPQ 223. Absent proof of such criticality in the present instance, it would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate the absorption coefficient as taught by Yamazaki ('375) into Yamazaki et al. ('096) process for the purpose of laser irradiating a semiconductor device.

Response to Arguments

Applicant's arguments filed 4/10/08 have been fully considered but they are not persuasive.

Applicant argues that beam overlap is not taught. The examiner respectfully disagrees because Yamazaki et al. states in addition the optical system combines the beam spots of all laser beams into one beam spot by having the beam spots overlap each other.

In response to applicant's argument that the examiner's conclusion of obviousness is based upon improper hindsight reasoning, it must be recognized that any judgment on obviousness is in a sense necessarily a reconstruction based upon hindsight reasoning. But so long as it takes into account only knowledge which was within the level of ordinary skill at the time the claimed invention was made, and does not include knowledge gleaned only from the applicant's disclosure, such a reconstruction is proper. See *In re McLaughlin*, 443 F.2d 1392, 170 USPQ 209 (CCPA 1971).

In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to M. Alexandra Elve whose telephone number is 571-272-1173. The examiner can normally be reached on 7:30-4:00 Monday to Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tu B. Hoang can be reached on 571-272-4780. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

July 21, 2008.

/M. Alexandra Elve/
Primary Examiner, Art Unit 3742